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1

Urinary System

*Urinary System consists of the

Kidney (2) كليتين - ureters (2) حالبين

Urethra. حالبين - Urinary bladder مثانة

* Kidney consists of :-

1- Cortex قشري → Blood supply 98 %

2- Medulla نخاعي → Blood supply 2 %

*The nephron :-

it's the functional unit of kidney.

it's about million nephron in each kidney.

each nephron is able to formation and excretion of urine.

*The nephron Consist of :-

1- glomerulus

2- renal tubule.

1- glomerulus :-

it's tuft of capillaries (50 - 70 capillary)

it's function is filtration

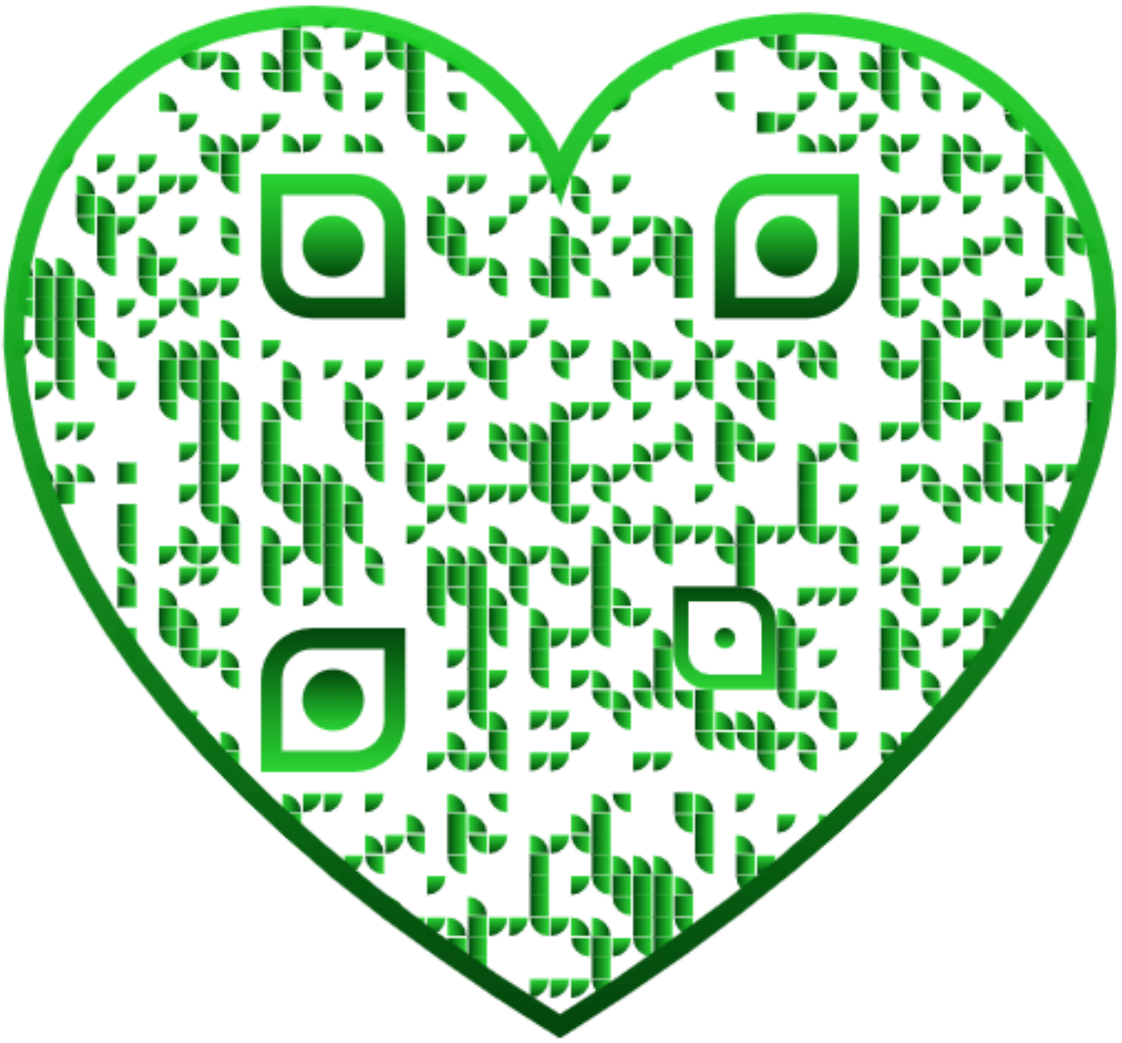
afferent arteriole → glomerular capillary → efferent arteriole.

Renal blood flow (RBF) - 1200 - 1300 ml/Min.

Renal plasma flow (RPF) = 650 ml/min

Kidney filtration for plasma → water 90% / dissolved S. 10%

عن إستخدام الطبيعي يشتغل 250,000 نيفرون ولو توقف منها جزء تتعوض من بقية النيفرونات الموجودة في الكلية لو توقفت عن 250,000 تدخل في renal failure



- The bleed enter to glomerulus by afferent arteriole & leaves by efferent arteriole.
- the hydrostatic pressure is (60 mmHg) more than other capillary in the body.
- the osmotic pressure. is 25 mmHg → 32 mmHg
- the amount of plasma which enter the Capillary 650 ml/min. & the plasma which filtrate is 125 ml/min.
- the remain of plasma which don't filtrate 525 ml/min. → back to circulation.
- * Why the hydrostatic P. is high in glomerular Capillary ? Because of.

1- the glomerular Capillary Connect between 2 arterioles.

2- narrowing of efferent arteriole. (Which lead to accumulation of blood in glomerular capillary)

2- Renal tubule :-

- There are 4 renal tubule :-

a- proximal Convoluted tubule.

b- Loop of the henel → descending → thin
→ ascending → thick

c- Distal Convoluted tubule

d- Collecting tubule → Cortical
→ Medullary

- 8 of distal tubule form one collecting tubule, so it's about $\frac{1,000,000}{8} = 125,000$ in each kidney.

Capillary عندما تمتد الى upper end. لها of renal tubule تكون جدارها الى wall called Bowman's Capsule

BIZRS

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* Function of the Kidney :-

1- formation and Excretion of urine.

a- filtration

b- reabsorption (from renal tubule to the blood)

c- secretion (from blood to renal tubule, without filtration)

2- homeostasis :-

(Keep the internal environment Constant) الحفاظ على البيئة الداخلية

Homeostasis

Kidney يعمل

1- pH

2- Water

3- ion

3- Regulation of erythropoiesis

* erythropoiesis ⇒ formation of RBC.

Kidney secrete erythropoetin ⟶ stimulation of Bone marrow to form the RBC.

* erythropoetin stimulate by :-

1- hypoxia 2- Androgen.

3 Cobalt salt.

4- Regulation of the atrial blood pressure :-

during hypotension ⟶ renal ischemia ⟶ secretion of Renin ⟶ Convert of angiotensinogen to angiotensin I then to angiotensin II ⟶

Cause 1- V. C.

2- aldosteron secretion.

5- Regulation of acid-base balance :- by

Base ← HCO_3 / acid ← CO_2 = 20 / 1

Lung ← 1- Blood (chemical buffer)

2- respiratory (CO_2)

3 Renal (HCO_3)

↑ CO_2 → acidosis.

↑ HCO_3 → alkalosis.

- pH = 7.41 (in blood)
- pH = 6 (in urine) → acidic
- pH: alkaline كلت لو ← alkalosis ← 1- نباتية نسبة HCO3 بقدر الـ
- 2- UTI → (urinary tract infection)
- 6- Detoxification → (in liver & kidney) الكبد
  - benzoic acid → toxic substance (found in pepsi) وبتحول الصوديوم Kaline الـ
  - benzoic acid conjugated with glycine
  - to form (para amino hippuric acid) → which
  - Excret with urine. non-toxic substance.

* clinicle important :-

- hepato-renal syndrome ← يمنع شرب مشروبات غازية
- يمنع من اللحوم ← لانها ترفع الامونيا واذا ارتفعت تنتقل الى المخ وتسبب Hepatic Coma
- * وهذا المريض ضروري ماكل له Constipation ← لانه يساعد في تكوين الامونيا في القولون

7- endocrine function :-

1- Renin → regulation of arterial blood pressure

2- erythropoietin → regulation of erythropoiesis

3- prostaglandins → prostaglandin Es

→ prostaglandin I2 → ↓ platelets aggregation, ↓ V.D

4- 1,25- DHCC → (active form of vit. D3)